Vol. XXVI, pp. 209–212 December 20, 1913

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PARALLELISM IN MORPHOLOGICAL CHARACTERS AND PHYSIOLOGICAL CHARACTERISTICS IN SCOLYTOID BEETLES.

BY ANDREW D. HOPKINS.

Parallelism in morphological characters and physiological characteristics in the superfamily Scolytoidea relates to the occurrence of the same, or similar elements of structure, or the same kind of activity, in two or more species, genera, subfamilies or families.

Parallel species, genera and larger groups are those in which structure or habit is, in many respects, alike. Such species or groups may be closely allied, or more less widely separated.

Universal parallelism relates to repeated, or multiple origin, development and evolution of the same, or similar inorganic, or organic form, or activity.

This tendency towards parallel development appears to be in accordance with a fundamental principle, or law, *of parallelism in evolution*, under which, the origin and evolution of the same form or activity, under the same, or similar physical influences has been repeated many times, or in other words, that under similar environments, needs and requirements in nature, independent development and evolution, from a common base may produce repeatedly the same, or similar morphological and physiological results.

If this is true we should find evidences of it in any series of objects or activities which are the result of evolutionary processes. Scolytoid beetles have been selected as an example of such a series: 1st, because I have made a special study of them, 2nd, because my ideas of parallelism in nature are largely founded on the evidence they have furnished.

* Abstract of a Paper read before the Society November 29, 1913.

Morphological Characters.

The antennal club, eyes, head, thoracic segments, legs, wings, abdominal tergites and sternites, spiracles and stridulating accessories, present many examples of parallel modification in widely separated species, genera and families. The same is true of many elements of the secondary sexual characters and internal anatomy.

The antennal funicle is perhaps the most important taxonomic element of the Scolytoid beetles. It is one of the first things to look for as a guide to the combination of characters which distinguish the genus. While the same number of joints may be parallel many times in connected, or disconnected genera of the same subfamily, and in different subfamilies, there must be, as applied to these beetles, the same number of joints in all of the species of a genus.

In the 221 genera, representing 16 subfamilies, the number of joints in the funicle is paralleled as shown in the following table:

3	genera	representing	1	subfamily	have	1	joint.
6	"	"	2	subfamilies	"	2	joints.
13	"	"	4	"	"	3	"
44	"	"	7	"	"	4	"
73	"	"	9	"	"	5	"
31	"	"	9	"	"	6	"
51	"	"	9	"	"	7	"

The food, social and sexual habits, character of the brood galleries, choice of host plants and distribution of genera and species are all more or less rich in facts of taxonomic importance and parallel development.

In the social habits we find some features of special interest, both in their relation to taxonomy and to parallel lines of modification. In the relation of the sexes there is a wide range of difference and progressive modification from simple or unorganized, but intensive polygamy, towards a gradual reduction in the number of females and finally specialized monogamy. We have here a remarkable case of social evolution which in a like manner has been paralleled in that of the human species.

There is a wide variation in the types or forms of the egg and brood galleries within the families, subfamilies, the major

and minor groups and in some cases within the genus. The fact that there is a quite definite relation between the type of the gallery and the systematic position of the species, genus and group indicates that the evolution of the gallery has been from the simple to the complex *and that it has progressed with the evolution of the species which make and inhabit them*, in a similar manner to that of the evolution of human dwelling place from the simple cave to the modern palace.

The fact that the same or a similar type of gallery is formed by species of widely separated genera and subfamilies can not be so satisfactorily explained, on the theory of phylogeny, as it can on the theory of parallel evolution according to which two or more species, evolving along parallel lines, do things alike at like stages in the evolutionary process.

Thus we see that parallel modification in morphological and physiological elements is an important factor to be considered in taxonomy. It is evident from a comparative study of the various systems of classification that the failure of taxonomists to fully realize its importance has led to many erroneous conclusions and much confusion.

In conclusion, it seems to me that we have two fundamental questions to be answered in regard to the origin, evolution and classification of organisms.

1. Are the taxonomic characters and characteristics of the species, genus, family, order, class, and kingdom *the result of phylogenetic descent from a single ancestral nucleus, through natural selection and the inheritance of selected characters?* or

2. Are they *the result of phylogenetic descent from many nuclei through natural selection and natural parallelism?*

I am inclined to the belief that an affirmative answer to the second question would be more nearly in accordance with natural law.

While phylogenetic descent from a single source is represented by a single genealogical tree, parallelism from different sources may be represented by a forest of genealogical trees with their different elements as near alike as are the branches, leaves, flowers, and fruit of a forest of oak trees.